REMARKS

Claims 1-3 and 10-12 have been rejected under 35 U.S.C. §102(a) as being anticipated by U.S. Patent No. 6,271,574 to Delpech et al. ("Delpech").

Claims 4-6 and 13-18 have been withdrawn.

Claims 7-9 and 19-20 have been canceled.

Claims 1-3 and 10-12 remain pending.

Rejection of Claims 1-3 and 10-12 under 35 U.S.C. §102(a)

The Office Action states that Delpech teaches all of the elements recited in Applicants' claims except that the two minimum design width end portions and the sub-minimum width link portion are produced simultaneously in one photolithographic operation. The Office Action further states that this is a product-by-process limitation and therefore is given no patentable weight in a device claim, and that the final structure of the claimed invention is identical to the Delpech device. The Office Action also states that Delpech does not explicitly teach the spacing between said center portion and the end portions is sufficient to prevent the end portions from serving as a heat sink, but that this feature is inherent in Delpech's structure because the claimed structure is identical to the Delpech structure.

Applicants' invention and Delpech employ substantially different photolithographic approaches to produce a sub-minimum width link, with other circuit elements all having a minimum design width produced by the photolithographic process, which establishes the density of all the fuses.

Applicants' invention recites a fuse that is superior to the fuse disclosed in Delpech. Applicants' fuse teaches improvements in fuse density, reproducibility, and control over the sub-

minimum region, both in the width and length dimensions of the sub-minimum width link, as well as the relative registration of the sub-minimum width link within the fuse neck.

In contrast, Delpech teaches the utilization of "at least one dummy element having a spacing from said at least one second portion for providing an optical proximity effect during processing so that the second width is less than the first width".

Referring to Figures 7 and 8 of Delpech, the center portion of the fuse has a width DW1 in Figure 7, which is the minimum design width in Delpech, and the photolithographically produced dummy elements D22 and D23 are separated from the center portion by spacings DE3, which are approximately equal to the minimum design width DW1. Moreover, the spacings DE3 are not larger because otherwise the dummy elements D22 and D23 would not provide their desired proximity effects to create the sub-minimum width W1=WMIN link portion shown in Figure 8.

Delpech requires the registration of at least one dummy element 22, 23, and preferably two dummy elements 22, 23, in relation to the length L of the fuse in Figure 3, so as to minimize the variation in R3 and Ra2.

Further, Delpech indicates in col. 3, lines 43-60 (see Fig. 3), that the center portion is spaced from the two end portions by a spacing equal to less than twice W1. In contrast, and recited in Applicants' independent claim 1, the center portion is spaced from the two end portions by a spacing equal to at least twice the minimum design width.

In order for Delpech to create the jogs of the fuse element 4 (for example in his Figure 8), the dummy elements 22, 23 must contain non-orthogonal edges as shown in Figure 8. Structures having such edges are known in the art to produce significant non-systematic offsets in the proximity created shape of the fuse element 4, due to the inherent inability to resolve such shapes

photolithographically. This provides unwanted substantial variations in both the width WMIN and the length of a WMIN feature.

In the best mode taught by Delpech, two dummy elements 22, 23 are used, one on either side of the fuse 4 (shown in Figure 8), to produce a sub-minimum link WMIN. This compounds the situation previously described, which in the best mode has two jogs imaged in fuse 4, both having non-systematic errors. In addition, the best mode of the fuses taught by Delpech uses three minimum images, images of the fuse 4, dummy element 22, and dummy element 23, for each fuse, thus decreasing the packing density of repeated fuse elements. Moreover, the added dummy elements inadvertently create a thermal path to the substrate and subsequently hinder the final programming of the fuse 4.

In contrast to Delpech, the length of the minimum width feature of the present invention is fixed by the original placement of the fuse jog and or space, and is not subject to a registration error of a neighboring dummy element to the "active" fuse shape.

The minimum image of the present invention is created by recognizing a sub-minimum space or jog (all of which are orthogonal shapes) in an otherwise continuous image bridging the two images with a third repeatable sub-minimum feature. The present invention does not suffer from the edge translation of Delpech. As a result, the fuse neck length can be of a minimum dimension since the translation tolerance does not have to be incorporated into the design of this fuse. Delpech must account for this, which may result in fuses that cannot be programmed when the non-systematic error translates into elements, that when printed, do not create a Wmin.

In contrast to Delpech, Applicants' invention requires only one image per fuse, thus Applicants' fuse is able to be denser than the fuse taught by Delpech, and therefore has a density advantage over Delpech.

Delpech's having one or two dummy elements per fuse also imposes two other deficiencies. Delpech must deal with the thermal leakage into the dummy elements, and provide a programming power to overcome this limitation. This limitation may result in inefficient programming of an intended fuse element (i.e. more power and/or more time are required), and also in unwanted programming of neighboring fuses due to the self heating of the dummy elements that will translate to neighboring fuses.

Additionally, the dummy elements in Delpech are subject to charging. As shown in Delpech, the dummy elements are not contacted. If, however, the dummy elements were contacted, the fuse density of Delpech would further degrade. Such charging can unintentionally and uncontrolledly effect the programming of the active fuse elements.

For the reasons detailed above, the structure taught in Delpech is not the same as applicants' claimed structure. Therefore, the limitation of the spacing between said center portion and the end portions being sufficient to prevent the end portions from serving as a heat sink is not inherent in the structure taught by Delpech.

In view of the foregoing, it is respectfully submitted that Delpech does not teach or suggest the subject matter recited in Applicant's independent claim 1.

Claims 2-3 and 10-12, which depend directly or indirectly from the independent claim 1, incorporate all of the limitations of the independent claim 1 and are therefore patentably distinct over Delpech for at least those reasons provided for independent claim 1.

Conclusion

In view of the foregoing, applicants respectfully requests reconsideration, withdrawal of all rejections, and allowance of all pending claims in due course.

Respectfully submitted,

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